

rounded whorls and a less distinctly plicate columella. There is also an umbilical chink, which is usually absent in *catascopium*.

Like Walker's *Lymnæa bakeri* from Michigan, *nashotahensis* is apparently an extinct species peculiar to marl deposits. The specimens were secured by Mr. F. M. Woodruff.

NOTES ON PLANORBIS II: P. BICARINATUS.

BY BRYANT WALKER.

(Concluded from May Number.)

IX. Miscellaneous.

In Beck's Index Moll. (1837), p. 118, the following synonymy of this species is given:

"*Planorbis bicarinatus* Say. Am. Sepr. C. C.

a. major. S. g. iv, 4. W. S. vii, 12. Fl. Schuylkill.

Pl. angulatus Wood.

b. minor.

an *P. eburneus* Ch. ix, 1123? New Jersey."

P. angulatus Wood, Index Testaceologicus, edit. II, 1828, Suppl., pl. 7, f. 12, is a typical *P. bicarinatus*. The figures in Sowerby's Genera, referred to by Beck (as "S. g.") are the same species.

Beck defined his *minor* only by a queried reference to Chemnitz's figures of a West Indian species, really entirely different.

DISTRIBUTION.

The recorded distribution of *Planorbis bicarinatus* is shown with approximate exactness upon the accompanying map (pl. III). These data are primarily based upon the collection of the Philadelphia Academy, the complete list of which has been kindly furnished by Dr. Pilsbry. To these have been added such additional information as was afforded by my own collection. The localities thus vouched for are indicated on the map by the black dots. These data have been supplemented by such specific localities as a careful search of the literature at my command afforded. These citations are represented by the outlined dots. Duplicate citations and those giving simply the "State" have been omitted. A detailed list of all localities and the authorities for the same is given below. The map does

not extend far enough north to allow the localities in Keewatin, Canada, to be plotted.

While the exhibit as a whole affords what is probably a fairly accurate view of the actual distribution, yet it also shows how lamentably small our knowledge really is of the range of one of our most common species, and how much still remains to be done before any generalization can be other than tentative. Still the chart is of interest as showing what we do know, and serves to indicate the regions to which attention of American collectors should be particularly directed. Thus the apparent absence of the species from the entire littoral Atlantic region (with the exception of a single record from Wilmington, N. C.) from the Potomac to Florida, and along the coastal region of the Gulf from Florida to Texas is very striking and worthy of investigation. So, too, the exact range towards the west is important and of considerable scientific interest. No doubt many of the deficiencies of the present map can be supplied from material already accumulated in the many private collections of the country, and it is hoped that this review of the subject will induce the publication of all such information for the benefit of those interested in the geographical distribution of the American fauna. For it is only by the accumulation of detailed information, such as is afforded by the publication of carefully authenticated local lists, accompanied by exact localities, that any substantial advance can be expected.

Taking the chart, such as it is, certain facts can be deduced with a great degree of certainty, while others must still remain more or less tinged with uncertainty until more exact knowledge shall either prove or disprove them. On the north it seems reasonably certain that *bicarınatus* extends through British America from Anticosti, New Brunswick and Nova Scotia west to at least Lake Winnipeg and Manitoba and north to Keewatin. In all probability it may be found to range west through Saskatchewan and Assiniboia well toward the Rocky Mountains.

The data already accumulated shows a distribution through the northern United States from Maine to Oregon. The northwestern data, though scant, tend to show that the invasion of the valley of the Columbia was through transfer from the headwaters of the Missouri or its tributaries to the Snake, Pend Oreille or other tributaries of the Columbia.

The accuracy of that veteran collector, Henry Hemphill, as to its occurrence at Antioch, California, quoted by Stearns (1881), is not to be questioned. But the fact that there is no other record of its occurrence in California certainly tends to show that the Antioch find was a sporadic colony, accidentally introduced, and which never succeeded in effecting a permanent foothold.

The citation of this species from the Yaqui River, Guaymas, Mexico, on the Gulf of California, by Stearns (1889), where it is said to have been collected by Palmer, is open to more doubt. It appears that *Polygyra hirsuta* was also alleged to have been collected at the same time and place. The nearest authentic locality for this species is southwestern Missouri. There is no evidence that *bicarinatus* has ever been discovered anywhere in the Colorado basin. The occurrence of two common eastern species at the same time in a locality so remote from the known range of either is certainly very remarkable, and would naturally raise a question as to whether there had not been an accidental mixing of specimens. *Bicarinatus* is not quoted from Mexico at all by Crosse and Fischer, and its occurrence at Guaymas is very improbable.

Leaving these two doubtful citations out of the question, the only authentic occurrence of *bicarinatus* on the Pacific coast is along the Columbia in Oregon; south of that the Rocky Mountains, no doubt, mark the western range of the species.

In the Potomac River at and below Washington, D. C., *bicarinatus* is an abundant species. South of that, with the exception of Wilmington, N. C., so far as the records show, it is absent from the entire coastal Atlantic region. In western North Carolina and northwestern Georgia it is found in streams belonging to the western drainage. We have no records from South Carolina and Florida. The large amount of collecting that has been done in various parts of the latter state goes to show that it does not occur there. South Carolina is practically unknown conchologically. It was not found by Henderson at Yemasee, Beaufort Co. (NAUT. XXI, p. 7). Mr. Wm. G. Mazyek, of Charleston, S. C., informs me that he has never known of its occurrence in that state, and that it is not quoted in either of Ravenel's Catalogues of 1834 or 1874. In Alabama, though not abundant, it occurs in the northern part of the state, and extends in the Alabama drainage as far south at least as Pinehill, Wilcox Co. There are no records for either Mississippi or Louisiana.

In Texas it is an abundant species, at times, in the central eastern part of the state, and no doubt ranges north from there. But there are no records from the valley of the Rio Grande and, as stated before, none from Mexico. This river would therefore seem beyond the southwestern range of the species.

So far as the records show, it is apparently absent from the entire coastal region on the Gulf.

Since the above was written and the map (Plate III) was prepared, Mr. H. H. Smith has collected typical *bicarinatus* in Beaver Creek, Conecuh Co., Ala. This "find" not only carries the species further south than previously recorded, but brings it into the western extension of the Atlantic fauna area along the Gulf Coast. Beaver Creek is a tributary of Murder Creek, which forms part of the Escambia River drainage system.

West of the Appalachian Mountains, *bicarinatus* is, in suitable localities, a common species in all the states as far west as Kansas and Colorado, and there is no great doubt but that it ranges, in suitable environment, west to the mountains. But the data at hand are too few and too scattering to give any exact information as to the limits of the western range. They are indicated on the map and given in detail in the following list:

DISTRIBUTIONAL DATA.

United States.

Alabama: Big Willis Creek, Atalla; Coosa River, Minnesota Bend; Black Warrior River, Jefferson Co.; Cub Creek, Pinehill; Princeton (Walker); Beech Creek, Selma; Cahawba River (Lewis); Coosa River, Farmer (Hinkley).

Arizona: None.

Colorado: Boulder (Pils.); Lodge Pole Creek, Logan Co.; Owens Lake, Boulder; Weld Co.; Greely (Henderson).

Connecticut: West Granby, Hartford Co. (Pils.).

Arkansas: White River, Carroll; Big Creek, Sebastian; Ouachita River, Hot Spring (Sampson).

Delaware: Brandywine River, between Dupont's and Rockland (Pils.).

District of Columbia: Washington (Pils.).

Florida: None.

Georgia: East Rome (Pils.); Silver Creek, East Rome; Armuchee Creek, Rome; Dalton (Walker).

Idaho : Old Mission (Pils.); Blue Creek, Cœur d'Alene Mountains; Cedar Creek, Priest Lake (Walker).

Illinois : Athens; Rock Island (Pils.); Joliet (Ferriss MSS.); Cook Co.; LaSalle Co.; Des Plaines River; Kappa, Panala, Woodford Co.; Crystal and Silver Lakes and Algonquin, McHenry Co.; Mercer Co.; Elgin, Kane Co.; Illinois River and Dogfish, Quiver and Matanzas Lakes, Havana, Mason Co.; Fourth, Sand, Cedar, Fox, Pistakee, Clear, Long and Slough Lakes, Lake Co.; Pope Co.; Johnson Co.; Thompson's Lake, Fulton Co.; Milan, Rock Island Co.; Pekin, Tazewell Co. (Baker).

Indian Territory : Tushkahama (Ferriss, MSS.).

Indiana : Randolph Co. (Pils.); Cedar Lake; Bass Lake, Stark Co. (Baker); Connorsville, Danville (Walker); Richmond, Wayne Co. (Plummer); Indianapolis, Whitewater Basin, West Whitewater Basin, Maumee Basin, St. Joseph Basin, Lake Michigan Basin (Call), Franklin Co. (Moore and Butler); Lake Michigan, Michigan City; Lake James, Steuben Co.; Clear Lake, LaPorte Co. (Daniels).

Iowa : Iowa City; DeWitt; Clear Lake; Davenport (Pils.), Muscatine, Des Moines, Ruthven (Walker); Spirit Lake (Keyes).

Kansas : Walnut Creek (Pils.); Topeka; Ellis; Soldier Creek, Silver Lake Twp., Shawnee Co.; Northern Wabaunsee Co.; Brown Co.; Cedar Creek, Mt. Ida; Barber Co.; McDowell Creek, Riley Co.; Kansas River, Wyandotte; Neosho Co. (Call).

Kentucky : Bowling Green (Pils.).

Louisiana : None.

Maine : Caribou, Aroostook Co.; Rockland, Knox Co. (Pils.); Orono, Fort Kent, St. John's River; Gelot's Lake, New Sweden; Second Lake, Fish River; Salmon Brook, Aroostook River; Woodland, Collins' Mill Pond, Portage Lake, Square Lake, Aroostook Co.; E Warren; Rockville (Walker); Cross Lake Inlet; Cross Lake; Moose River, Somerset Co. (Nylander); Moosehead Lake (Johnson); Portland (Pickering).

Maryland : Cumberland; Hancock; Chestertown, Kent Co.; Flintstone, Allegheny Co.; Conecocheque River at National Road (Pils.); Potomac River, Fort Washington (Walker).

Massachusetts : Pontoosuc Lake, W. Mass. (Pils.); Cambridge; Amherst (Walker); Fresh Pond (Adams); Swampscot, Lynn and vicinity (Tufts); Stockbridge (Ferriss, MSS.); Bristol Co. (Taylor and Shiverick).

Michigan: The writer has records from 52 of the 83 counties of the state, indicating a general distribution throughout the state. The counties represented are shown by the map (plate II).

Minnesota: Lake Albert Lea; Fergus Falls (Pils.); Stearns Co.; Lake Minnetonka; Cannon Lake, Rice Co.; Shackleton Lake (Walker); Minneapolis; Lake Minnewaska, Pope Co.; Vermilion Lake, Winona, Lake Co.; St. Louis Co. (Grant); Clearwater, Wright Co. (Sargent); Harriet Lake, Hennipen Co. (Daniels); Heron Lake, Jackson Co.; Eagle Lake, Sherburne Co. (Stearns).

Mississippi: None.

Missouri: Pettis Co.; Lamar, Barton Co. (Sampson).

Montana: Mingusville, now Wibaux (Squyer).

Nebraska: Sidney (Walker); streams of eastern Neb. (Aughey); Omaha (Tryon).

Nevada: None.

New Hampshire: Profile Lake (Walker); Keene (Walker and Coolidge).

New Jersey: Greenwood Lake, Passaic Co.; Raritan River; Cedar Lake, White Pond, Warren Co.; Swartzwood Lake, Sussex Co.; Center Twp., Camden Co.; Delaware Water Gap; Princeton, Mercer Co.; Lake Hopatcong, Budd's Lake, Morris Co.; Hackensack Valley; Closter, Bergen Co.; Trenton; Gloucester Co. (Pils.).

New Mexico: Las Vegas; South Spring River, Roseville; Trementina; Santa Fe; Arroyo Pecos, Las Vegas (Pils.).

New York: Cazenovia; Skaneateles Lake; Long Island; Niagara; Hudson River, Fort Warren, Ridgewood; Racquette Lake, Hamilton Co.; Queens Co.; Squaw Island, Niagara River; Troy (Pils.); Gannagagee Creek, Erie Co.; Alfred; Watertown; Canandarago Lake, Otsego Co.; Cedar Lake, Herkimer Co.; Old Forge (Walker); Sunset Creek, Otsego Co. (Smith); Chatauqua Lake (Maury); Schuyler's Lake, Otsego Co.; Mohawk River, Little Lakes and Erie Canal and Litchfield, Herkimer Co. (Lewis); Onondaga Co. (Beauchamp); Rochester (Walton); Huntington, Centerport, Long Island (Smith & Prime); Cayuga Lake (Ferriss MSS).

North Carolina: Asheville; Greenfield Pond, Wilmington (Walker).

North Dakota: Hankinson (Pils.); Fort Stevenson (Stearns).

Ohio: Columbus; Geanga Co. (Pils.); Hudson (Walker); Cincinnati (Harper and Wetherby); Tuscarawas Co. (Sterki); "The Reserve" (Naturalist).

Oklahoma : Oklahoma City (Ferriss); Cimmaron River (Call).

Oregon : Willamette River; Salem; Portland (Pils.).

Pennsylvania : Delaware River (type locality), Say; Allegheny River; Round Island, Clinton Co.; Port Allegheny, McLean Co.; Youghiougheny River, Connellsville, Fayette Co.; Juniata River, Hollidaysburg, Blair Co.; Susquehanna River, Muncy; Cushelishia Creek, Indiana Co.; Emporium, Cameron Co.; Amity Twp., Berks Co.; Beaver River, Waupum, Montgomery Co.; Germantown and various localities, Philadelphia Co.; Nockamixon, Bucks Co.; Schanksville, Somerset Co.; Glenolden, Delaware Co.; Gettysburg; Ligonier, Westmoreland Co., York Furnace, York Co. (Pils.); Allegheny Co. (Stupakoff); Ohio River, Coraopolis (Rhoads); Chester Co. (Hartman & Michener); Lancaster Co. (Haldeman); Columbia; Susquehanna River, Wilkesbarre (Walker).

Rhode Island : Providence and Worcester Canal; Cunliff's Pond (Carpenter).

South Carolina : None.

South Dakota : Mouth of Big Sioux River (Lea).

Tennessee : Emory River and Harriman (Pils.); Chilhowee Mts.. Blount Co.; Franklin Co. (Walker); Tellico River, Blount Co. (Lewis); Little River (Ferriss MSS).

Texas : New Braunfels (Pils.); San Antonio (Walker); Pedernales River, Gillespie Co.; Brushy Creek, Williamson Co.; Colorado River and tributaries, Comal Co.; San Marcus River, Hayes Co.; Colorado River and tributaries, Travis Co.; Burton, Washington Co. (Singley); Hog Creek, McLennan Co. (Strecker).

Utah : None.

Vermont : Connecticut River, Hartland (Pils.); Middlebury (A ms)

Virginia : Luray (Pils.); Orange (Walker); Harper's Ferry (Tryon).

Washington : Cascades, Skamania Co. (Pils.).

Wisconsin : Milwaukee (Pils.); Menominee River; Wauwatosia; Honey Creek, Layton Park; Kinnickinnic River, Milwaukee; Golden Lake, Waukesha Co.; Little Cedar Lake, Washington Co.; Lake Winnebago, Calumet Co.; Kenosha (Chadwick).

West Virginia : Four miles from Romney; Kanawha River, forty miles south of Ohio River, Wirt Co.; North River, Sedan, Hampshire Co.; Warm Spring Creek, Morgan Co.; Salt Sulphur Spring,

Monroe Co.; Patterson's Creek, Mineral Co.; Potomac River, Cherry Run (Pils.); Potomac River, Harper's Ferry (Walker).

Wyoming: Yellowstone National Park (Stearns).

Dominion of Canada—Quebec: Meaches Lake, Hull; Chaudiere River; Chelsea (Pils.); Caprouge (Walker); Anticosti (Litchford); Brome Lake, Knowlton (Whiteaves MSS).

Ontario: Sparrow Lake, Simcoe District; Puzzle Lake, 40 miles north of Napanee; Rideau River; Ottawa River (Pils.); Little River, Walkerville (Walker); Lake Simcoe (Stearns).

Algoma: Dog River, north shore Lake Superior; Gores Bay, Manitoulin Island, Lake Huron (Walker); Moose Factory, Hudson Bay (Dall).

Manitoba: Lake Winnipeg; Lake Manitoba (Christy).

Nova Scotia: Dartmouth Lakes (Jones).

Keewatin: Lake St. Joseph; Kawinogans River, Albany River. Knee Lake (Whiteaves); Saskatchewan River, Grand Rapids (Dall.);

New Brunswick: Kennebecasis River and elsewhere (Matthew and Stead).

Mexico: Yaqui River, Guaymas, W. Mexico (Stearns). See p.

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EXPLANATION OF PLATE I.

All the figures are x 2, except Fig. 10, which is x 3.

Fig. 1. *P. bicarinatus aroostookensis* Pils. Collins' Mill Pond, Me.

Fig. 2. *P. bicarinatus aroostookensis* (topotype). Salmon Brook, Me.

Fig. 3. *P. bicarinatus* Say (typical). Delaware River, Phillipsburg, N. J.

Figs. 4 and 5. *P. bicarinatus angistomus* Hald. Independence Lake, Washtenaw Co., Mich.

Figs. 6–8. *P. bicarinatus unicarinatus* Hald (type). Schuylkill River, Pa.

Fig. 9. *P. bicarinatus portagensis* Baker (cotype). Portage Lake, Me.

Fig. 10. *P. bicarinatus corrugatus* Currier (type). Perch Lake, Kent Co., Mich.

Fig. 11. *P. bicarinatus royalensis* Walker (type). Siskowit Lake, Isle Royale, Mich.

Fig. 12. *P. bicarinatus percarinatus* Walker (type). Crystal Lake, Benzie Co., Mich.

NOTES.

AN INTERNAL SEPTUM IN HOLOSPIRA BARTSCHI.—In a specimen of this snail cut open there is a vertical septum across the cavity at about the middle of the eighth whorl. It is concave on the lower side, as in many *Urocoptidæ*. To abandon the early whorls is very common in Antillean and the larger Mexican forms but has not before been noticed in *Holospira*. The internal column in *H. bartschi* is very nearly one-third the diameter of the shell at the widest part, but it decreases to about one-fourth in the penultimate whorl.—
H. A. PILSBRY.